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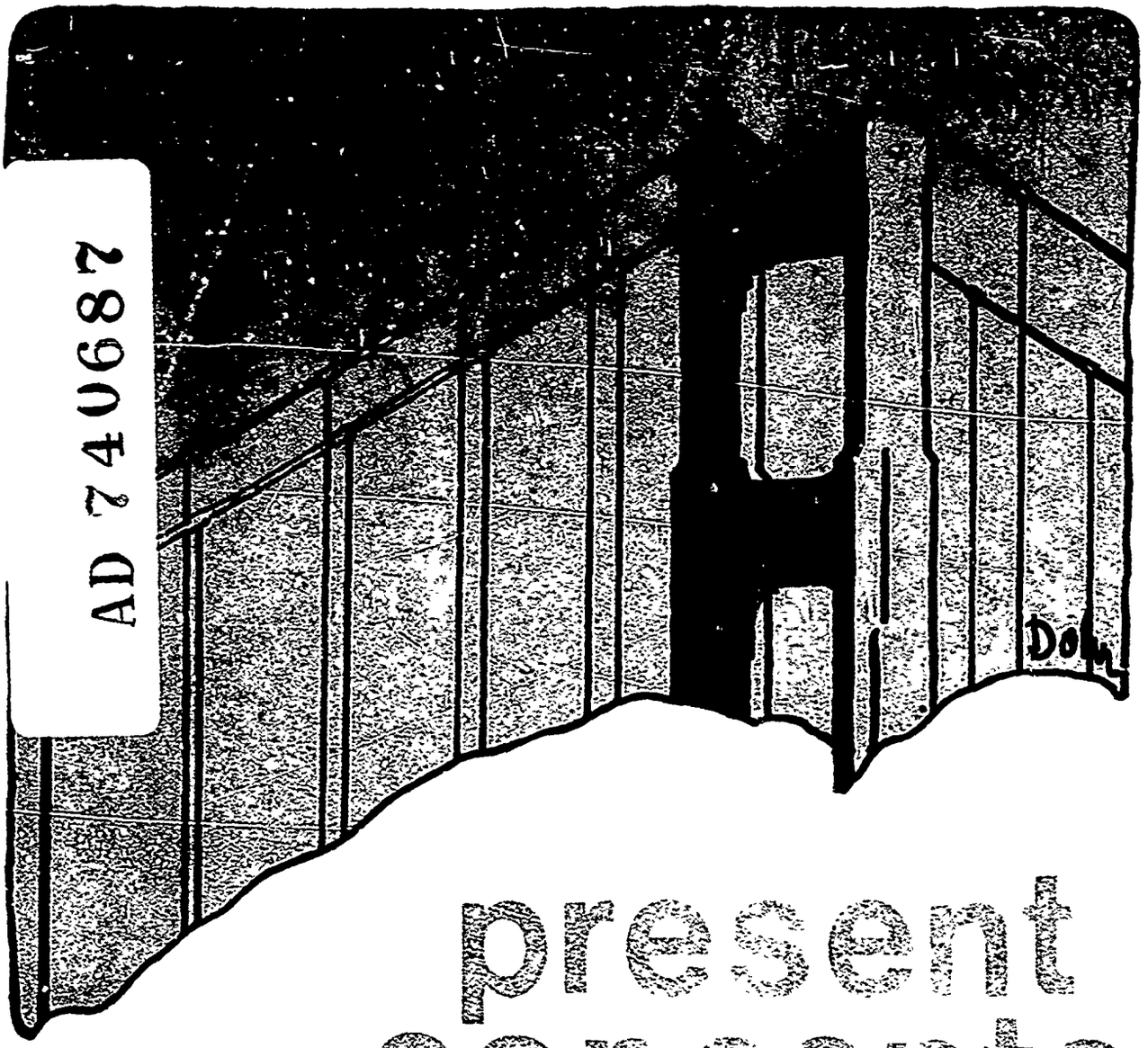

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PRESENT CONCEPTS IN INTERNAL MEDICINE

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13. ABSTRACT

This issue of Present Concepts in Internal Medicine is devoted to Medical Literature. A thorough search of the literature, including a MEDLARS scan, produced only five scientific analyses of medical journal article content. The results of these studies suggest disturbing inadequacies. Complicating the quality of a content problem is the sheer number of journals published (approximately 24,000, producing more than 500,000 articles annually). One section of this symposium is composed of three articles which give the reader a suggested approach to medical journal article analysis and a rapid method for judging critically a medical journal article for scientific soundness. The editorial by Franz J Ingelfinger, MD, reprinted with permission from The New England Journal of Medicine, deals with the positive influence upon the quality of medical jounalism which a conscientious editor can wield. This is followed by an article on "Misleading Advertising and Misuse of Drugs" (drug advertising -- misleading and misrepresenting; the physician -- misinterpreting and misusing). It is recognized that in many journals the space given to advertising practically conceals the scientific contributions and the techniques of presentation may make the advertising information, in spite of its obvious bias, more influential on the profession than the medical articles themselves.

One article presents the problems of purposeful reading and writing techniques, and another article surveys the indexes in a small medical library and gives a description of search and retrieval techniques. The symposium concludes with an essay by a physician on his personal filing system and his method of "keeping up with the medical literature".

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techniques of writing scientific articles						
FILING SYSTEMS, personal (for medical articles, etc)						
SEARCH and RETRIEVAL METHODS, medical						
INDEXES, medical						
ADVERTISING, drug						

PRESENT CONCEPTS IN INTERNAL MEDICINE

VOLUME IV *November 1971* Number 11

MEDICAL LITERATURE SYMPOSIUM

CONTENTS

Department of Medicine
LETTERMAN GENERAL HOSPITAL

FORTHCOMING SYMPOSIA. . .

GASTROENTEROLOGY, in two parts. The Small Bowel.

PEDIATRICS. A symposium on childhood conditions illustrated by case reports.

FOREWORD

This issue of *Present Concepts in Internal Medicine* is devoted to Medical Literature. Strange as it may seem, there is surprisingly little self-analysis of the quantity or quality of medical literature. A thorough search of the literature, including a MEDLARS scan, produced only five scientific analyses of medical journal article content. The results of these studies suggest disturbing inadequacies.

Complicating the quality of a content problem is the sheer number of journals published. According to Dr. Eugene Garfield, President of the Institute for Scientific Information (publisher of *Citation Index*), there are presently greater than 24,000 different medical journals published annually, producing more than 500,000 articles. This makes interesting the challenge of "Keeping up with the literature".

Most medical journals derive a good deal of their financial support from advertisements, principally from pharmaceutical firms. In many journals the space given to advertising practically conceals the scientific contributions. Clever techniques of presentation may make advertising information, in spite of its obvious bias, more influential on the profession than the medical articles themselves.

Each of these problems is dealt with head-on in this issue of *Present Concepts*. Doctor Ingelfinger deals with the positive influence upon the quality of medical journalism which a conscientious editor can wield. Our own Medical Editor, Mrs. Applewhite, and I tackle the problems of purposeful reading and writing techniques and evaluating the "scientific soundness" of content. Colonel Deller ascends to the pulpit once again to analyze the consequences of irresponsible drug advertising in medical journals. Our Medical Librarian, Miss Caruso, and Doctor Becker concentrate in their articles on the formidable tasks of locating specific sources of information and attempting to keep up the literature.

MAJ CARL C. PECK, MC
Guest Editor

. . .Should the process of peer review be reserved for the young investigator, or must it be applied to authors regardless of academic position or stature? Do editorial boards aid or obstruct the well-established investigator by submitting his manuscript to arduous and somewhat time-consuming process of consultant's review?

. . .All too familiar is the recurring phenomenon of the brilliant scientist who displays faulty judgment sometime during his professional career, at least to the extent that he later regrets publishing data which were premature or unsound. . .Surely the editor must share some of the responsibility for these inglorious and unnecessary journalistic mishaps!

. . .we cherish a recent response from the author of a paper which was not accepted for publication. This investigator, a physician of national repute, wrote, "After considerable reflection, I realize that your referees are correct. This paper does not warrant publication, and I am grateful that you have saved me from releasing an inferior report."

– Alfred Soffer, M.D., F.C.C.P.
From an editorial.
CHEST, 57:405, May 1970

EDITORIAL

EDITORS WHOSE DEEDS EXCELLED*

Franz J. Ingelfinger, M.D.
Editor, New England Journal of Medicine

What influence, if any, does the editor of a professional journal exert on the medical practice of his day? He can of course, because of the prerogatives of his position, exploit precious page space to urge caution, to beat his lexical drum for action, or to ask rhetorical questions such as the one that begins this paragraph. The response of the reader, however, depends less on the logic of the editor's words than on the reader's convictions. He who agrees nods with satisfied approval. He who feels challenged writes a scathing letter. Many a subscriber skips editorials entirely (I always did). Thus, a tiny fraction, a few cells in the entire readership corpus, will be sufficiently persuaded by the editor's words to re-examine its beliefs. Let's face it, Irvine Page will influence few adherents of big government in medicine, Russ Elkinton will change few hawks into doves, and what Walter Bornemeier says will not affect administration at New York's Montefiore Hospital.

Though an editor may find that his finest words lead only to more words, his deeds less consciously aimed at influencing doctors may paradoxically be much more important. If he insists that no criteria other than quality and pertinence be used in selecting journal articles, that his published reports express certain standards of ethical research, and that the best technics of communication at his command be used, how can he help promoting similar goals for the teachers and researchers who write his articles, and for the varied classes of readers who put the information he publishes to use? Conversely, a medical literature responsive to vested interests, to priority claims, to iteration of the same idea, and to vulgarization merely designed to attract customers will nourish similar attitudes in those who create and those who apply medical knowledge.

A fortnight ago marked the retirement of Alexander Gutman and Russell Elkinton, editors of two of America's most disginguished journals. Gutman

*Editorial, *New Eng J Med* 285:177 (15 Jul) 1971. Reproduced with permission from the author and publisher.

founded the American Journal of Medicine 25 years ago and has been its editor ever since. Elkinton, in an 11-year span, vitalized a routine operation and made the Annals of Internal Medicine a publication that is at once current and yet dependable. What two better journals devoted to internal medicine exist in the world? Their circulation figures and number of citations provide objective measures of what their editors have accomplished. But such figures merely prove that good guys do win ball games – although it may take 11 or more innings. Far more important, by their example these good guys must have persuaded both their contributors and readers that the ideals of quality and rectitude, much denigrated these days in favor of immediate applicability and easy adjustment, are the verities that must guide medical practice or, for that matter, any worthwhile human effort.

MISLEADING ADVERTISING AND MISUSE OF DRUGS

COL John J. Deller, Jr., MC

This is a sermon, written though it may be instead of spoken, it is never-the-less a sermon. I feel fully justified in preaching it for I have been involved — as have you — in the subject of the discussion.

Much is written about the "drug scene" and the monstrous problem of drug abuse and much frenzied action (and not little money) is now being expended to do something; but the question is, to do what? It's true that the drug abuse problem is now acute and as such prompt action must be taken to curtail it or at least keep it in check.

An outbreak of cholera can be devastating — it can kill and it can spread and it requires immediate concentrated effort to bring it under control. However, the outbreak is but an unmasking of a much larger problem — a complex problem of poverty, social unrest and inadequate medical care. Likewise, the problem of illicit drug use by an individual or by a whole culture, for that matter, is merely a symptom of a much larger problem — also a complex problem of poverty (poverty of human interactions and meaningful human relationships much more than an economic poverty), of social change and of misdirected medical care.

Directing all of our efforts at drug abuse by young people while ignoring drug misuse by our own profession seems an ill-fated course to follow. Also, to fail to consider the much broader perspective of how both these forms of drug abuse have come about is to follow no course at all.

One hears reference to "the drug culture" and this usually connotes the hippy commune where various illegally procured psychoactive drugs have become a way of life...but is that all there is to the present drug culture? In their most persceptive book, MYSTIFICATION AND DRUG MISUSE /1/ (where, incidentally, I found many of my own thoughts on this subject

most eloquently discussed and I would highly recommend it to you for reading), Lennard, Epstein, Bernstein and Ranson report that in 1969 pharmacists in the United States filled more than 202 million prescriptions for psychoactive drugs, which averages more than one prescription for every man, woman, and child in this country (and that is only outpatient prescriptions!).

Review of our own statistics of prescribing over the past year is also quite revealing. Approximately $50,000 was spent by our own hospital pharmacy during FY 1971 for the simple anti-anxiety agents. The majority of this was spent on the three most popular agents: meprobamate, Librium® and Valium® . (The cost of these same drugs without the U.S. Government discount would be at least $100,000.)

Certainly, the mere volume of such prescription drugs makes one wonder whether the term "drug culture" might not be applied to a much larger segment of our population. Illicit drug abuse is but the top of the iceberg — the much larger, submerged section is composed of "legitimate" drug misuse.

Having to this point introduced the sermon, I must define its limits before proceeding. There are a number of ramifications of this problem. The one I would like to develop, however, is the role of the physician in promulgating the drug culture. The physician is in the pivotal position in the drug scene, he is constantly being misled into misusing misrepresented remedies for misinterpreted diagnoses, in misinformed and misguided patients.

DRUG ADVERTISING - *Misleading and Misrepresenting*

It may be more than mere coincidence that the drug abuse problem which plagues the young has come on the heels of the introduction and widespread use of psychoactive drugs by prescription. /2/ The pharmaceutical industry can be scored on two accounts for this development: the first — uncritical studies upon which strong claims of effectiveness are made, and the second — re-defining the normal trials and tribulations of every day living as medical problems and thereby extending the implications for these drugs to unrealistic proportions.

The anti-anxiety agents are by far the ones most commonly advertised to "cure" all the problems of every day life. These drugs fall into three classes /3/: the barbiturates; the substituted glycerol derivatives as typified by meprobamate; and the benzodiazepines, the newest class to take over the market which include chlordiazepoxide (Librium®), diazepam (Valium®), and oxazepam (Serex®).

The meprobamate story is typical of the first score. /4/ The efficacy of this drug was based primarily on casual observations, isolated case reports, trials on fewer than 10 subjects and uncontrolled series. /5/ Weatherall /6/ estimated that 80 to 90 percent of these reports were unacceptable as true scientific studies when put to tests of significance. In a search of the English literature by Greenblatt and Shader /4/, 26 controlled double-blind studies were found comparing the efficacy of meprobamate and placebos in relieving anxiety in psychoneurotic patients. Thirteen of these were negative. That is, they did not show meprobamate superior to the placebo. Eight were equivocal and five were considered to show that meprobamate was superior to the placebo — and three of these studies were done by the same investigator. Not only have we been duped into believing that meprobamate is a highly effective anti-anxiety agent, but we have also been misled into believing it to be relatively safe. This latter claim is equally false. Most critical authors find that meprobamate is no less toxic and no more effective than barbiturates in relieving anxiety, /6/ and there is considerable doubt as to just how much more effective both of these groups are in comparison with placebos. /7/

Similar discrepancies appear in the literature concerning the benzodiazapines. Librium® and placebos have been shown to produce greater improvement than is seen in patients not receiving any oral drugs. Although after the first week of therapy, patients receiving the drug were somewhat better than the placebo group, by the end of one month there were no differences. /8/ In another study comparing equivalent doses of Valium®and Librium® with amobarbitol, it was found that Valium® was preferred over Librium® and both were preferred over barbiturate — a strange preference since the two benzodiazapines are virtually identical in their pharmaceutical actions except for potency. /9/ All this adds up

to is a real question as to just how useful these anti-anxiety agents really are. Hollister /3/ sums up this problem succinctly. "The usefulness of anti-anxiety agents is still somewhat controversial due to a number of confounding variables: the fact that anxiety is often episodic; that placebo responses are frequent; that non-drug variables in the patient, prescribing physician, and context of treatment may affect the result; and possibly that using these drugs in traditional doses and dosage schedules does not lead to their best exploitation." If we were to grant that these agents may indeed have some advantage over placebos in some anxious individuals, we may be justified in prescribing them in select cases as adjunctive therapy and on a limited trial basis. However, to follow the wholesale prescription practice, as advised by the pharmaceutical industry, is to fall prey to the fallacy that anxiety is itself a disease, rather than a symptom, and that drugs offer a cure rather than a stopgap measure.

The second score against the pharmaceutical industry is perhaps even more reprehensible. I doubt if there is a medical journal that can be perused that does not carry an advertisement for these drugs to be used for the relief of distresses of every day life — stresses which in the past have been considered as a natural part of the human experience and a vital part, I might add, to growth and development of healthy responses to the demands to present day life. The pharmaceutical industry has taken upon itself to "medicalize" ordinary behavioral responses. In Seidenberg's article /2/ he comments on the pictures and captions of women distressed by washing dishes or bathing a child (the bulletin of the American College of Physicians recently ran a double page advertisement backing on its cover depicting just such a scene), of the executive who can't concentrate because of environmental noise, the newcomer who has trouble "fitting in", or the active sixty-five year old who is unable to face retirement. All these advertisements are directed toward one solution — happiness through pills. Rozac /10/ in THE MAKING OF A COUNTERCULTURE refers to one of the prominent hippy buttons of the day which seems to be "Right On" in this regard — BETTER THINGS FOR BETTER LIVING THROUGH CHEMISTRY (original version compliments E.I. DuPont).

The most disturbing aspect about such advertisements is that they bombard the physician continuously in their campaign to introduce solutions for social ills through pills. It is

paradoxical that we allow ourselves to be duped into prescribing these drugs for our patients for the same reasons that we scorn their use by our youth who are simply using them without the benefit of prescription. The social ills of the day — population explosion, infringements on individual privacy and depersonalization, environmental pollution such as noise and smog, and forced retirement — to mention but a few, are problems unreachable through a blunting of our responses to their cries for solution with pills. If we don't learn to deal with these problems of the day headon and now, how will we be able to cope with those more monumental ones that are sure to come?

THE PHYSICIAN - *Misinterpreting and Misusing*

The physician is in the key pivotal position in the drug scene. His job is a big one and he hasn't been doing it and perhaps it is not even compatible with the present day theme of "health care delivery" — a theme which seems to be concerned more with quantity than with quality! The physician's "precious time" is at stake — it is easier for him to read an advertisement in the journal or listen to a detail man than to peruse a more valid source of drug information (such as Pharmalogical Basis of Therapeutics by Goodman and Gilman or the more recent AMA Drug Evaluation). It is easier also — and much more expedient — for him to write a prescription for a tranquilizer than to analyze the real problem and deal with it more effectively and more permanently (and perhaps in the long run, more expeditiously and certainly more "satisfyingly"). In many instances it may be simply that the physician feels justified in giving his patients something, and if it can't be his time, then a tranquilizer will do. I wonder many times if the physician hasn't been misled (by the pharmaceutical industry and the mass media) into misinterpreting his patient's anxieties over the conflicts of everyday life as really representing true medical or psychiatric illness. Once he prescribes a drug he has no doubt temporarily reduced his patient's anxieties by implying that he has made a firm diagnosis and is able to treat it. /1/ I am sure he also temporarily reduces his own level of frustration about being unable to come up with a specific diagnosis and treat it forthrightly. Most physicians (psychiatrists excluded, I hope) find it unpleasant, some find it even impossible, to

"get involved" with the patient over a problem manifested by the symptom of "anxiety". Thus, they prescribe drugs but in truth the drugs do not reach to the source of the patient's anxiety; they may, in fact, prevent (or at least delay) one's pursuing more permanent options to deal with his underlying problems.

Where appropriate drug use ends and drug misuse begins is a difficult question. /1/ Certainly, when one believes that the problems of everyday life require chemical solutions, one is woefully misguided. Even big problems such as an unwanted child, an alcoholic husband, or an unhappy marriage (perhaps I should say especially big problems) require more than a masking of more fruitful solutions by drugs. When one crosses into the area of definite psychophysiologic responses to anxiety, the line between appropriate use and misuse becomes less clear. If the anxiety response which is causing significant other symptomatology can be temporarily alleviated by the adjunctive use of anti-anxiety agents then such therapy may be appropriate. In such a situation, there is even greater urgency, however, to attempt to alleviate the underlying pathophysiology so that a more permanent solution can be found.

What are the consequences of misuse of drugs under these circumstances? In the broadest context, it simply adds to the "drug culture". It perpetuates the idea that happiness is to be found in a pill and it makes the iceberg grow bigger and bigger. The availability of such large numbers of psychoactive drugs by prescription most certainly contributes to the availability of such drugs for resale and abuse by non-prescription users as well. On a more personal basis it undermines the doctor-patient relationship. The patient who comes to the physician with a sign around her neck reading "Help" finds the physician merely turning the sign over. The faith that the patient could put in her physician is put instead in his prescription. /11/ In the end, nothing is really accomplished. "Physicians are not responsible for all the worldly ills that are purported reasons for the great drug quest. Nor have we created the life situations that cause patients to plead for relief. Yet we do control our prescription pads and should control our professional organizations and advertising policies of their journals." /2/

We as physicians must stop perpetuating the drug culture by taking the easy way out. Although we have the license to prescribe we also have the right not to. What we need is a stronger conviction that we hold a pivotal position in this whole issue and exercise our power to do something about it.

CONCLUSIONS

Both the pharmacuetical industry and the medical profession can initiate major steps to reverse the trend of the expansion of the drug culture. At stake to the pharmaceutical industry is economic gain — but perhaps this is part of the bigger problem of society at large. Certainly the industry could devote its attention to developing newer and better remedies for real medical problems rather than better tranqulizers — there will never be a tranquilizer which can cure a disease by blotting out a symptom. So let's quit looking for one before someone comes up with a total "zombie-izer".

If the pharmaceutical industry cannot discipline itself, and I have no illusions that it can, then we in the medical profession must take the initiative. The first step must be a concerted effort to de-emphasize "better living through chemistry". The process is basically educational. It should begin at all levels of medical education at the same time and the time is now. Medical students must be taught how to deal comfortably and effectively with the anxieties of life through interpersonal relationships with their patients rather than through happiness pills. Practicing physicians must recognize their reliance on pills for expediency and if they are unable to handle their patient's psychosocial problems without "medicalizing" them and prescribing pills for them, then they should refer them to someone who can.

There is currently a vast untapped manpower pool of educated individuals whose talents could be applied to this problem — the so-called "jobless professionals". Herein lie both potent ingredients of the social problems of our time (which are spiraling the anxiety reactions that we are talking about) as well as a potential nucleus from which solutions to these problems could be formulated. The answer

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to the problems which underlie the drug quest of today are not going to be simple ones. They may yet be found in chemistry — but if so it will be in human chemistry.

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TECHNIQUES FOR READING AND WRITING MEDICAL LITERATURE

Lottie Applewhite, M.S.

Two years ago we /1,2/ presented instructions for preparing the medical paper in the "IMRD" (introduction, methods, results, discussion) pattern. There are other patterns, each serving specific purposes. A series of patterns will be introduced in this paper.

Moser /1/ wrote "read, read, read" then "write, write, write", and therefore I am approaching the subject of this paper through reading techniques used by the physician-writer selectively for different types of reading and then will attempt to interpolate these techniques into applicable patterns of writing the medical paper.

READING

Reading is in essence thinking. A skillful reader thinks as he reads and knows his purpose for reading each item. He knows which reading skill to choose each time and has developed the art of using it. Since there are multiple purposes for reading, it is readily apparent that the one-purpose and consequently the one-technique reader would be as handicapped as the one-tool mechanic./3/ Several basic varieties of reading skills which the scientist-physician probably uses frequently are listed in TABLE I.

All of the techniques suggested in TABLE I are types of skimming. Skimming, contrary to popular notion, is not just glancing down a page; it is thinking, differentiating, and recording selectively as the eyes move rapidly over a page and purposefully identify (1) the main idea(s) of the article, or (2) a particular fact, a single item or point, or (3) given details, such as the "hallmarks" of a format. The first type of skimming is probably used frequently by all well-trained readers; the second type is used frequently by an investigator

TABLE I

READING PURPOSE AND SELECTED READING TECHNIQUE

PURPOSE	READING TECHNIQUE
To get general information	Scan, relate by association
To get scientific proof	Critique methodology
To get a review of a subject	Select writing by an authority, analyze major points, categorize
To critique	
a. For possible publication	Evaluate content and editorial presentation; read several ways
b. For format (mechanics)	Use check list /2/*
c. For insight	Read author's personal statement (TABLE III, Level I)
To get main points (e.g. purpose, methods, results, conclusions)	Read abstract
To recall	Re-read abstract

*Appendix C, *Present Concepts in Internal Medicine*, Vol II No 11, November 1969, is an example of a check list.

as he develops support for his thesis, or by the professional researcher of literature; the third is a technique an editor uses as he studies a given journal so as to convert a manuscript into proper format and style. When the art of skimming is mastered, it is a well-defined and disciplined reading skill.

To draw an analogy, skimming the printed page is akin to surveying the land. When the reader skims, like the surveyor, he gets much of his information by observation. Also, like the surveyor, the reader is schooled -- he knows what to look for and how to look for it. He spots the significant points. He may lay markers. TABLE II lists (in an ideal fashion) some of the points and markers for the reader.

When one surveys an article for other than hallmarks, he should read critically. First, he should be free of any preconceived notions and try to grasp the author's purpose and the

TABLE II

POINTS AND MARKERS FOR THE READER

POINTS AND MARKERS	COMMENT
Look at the title	Title *should* determine subject and the subtitle *should* give the focal point of the author's thinking
Look at the names of the authors, their affiliation(s), the source of the investigation	These may indicate geographic approach, philosophy, stimulate recall and association
Read the abstract	The purpose, methods, results and conclusions *should be* stated so the reader has initially a quick survey of the article
Look at the whole article	
Survey the divisions/subdivisions	These give the reader a bird's-eye view, the skeleton or framework upon which the article is built
Survey the paragraphs for arrangement of facts	These give the reader a chance to determine for himself if the author is presenting his thoughts logically, statistically, in detail, chronologically, knowledgeably
Survey the graphic aids	These *should be* self-sufficient so that the reader may gain advanced information on the ideas and interpretation of data
Look for author's statement of purpose	The introduction *should be* so precise that the reader knows the author knows the purpose of his writing this article
Define one's purpose in reading the article	One's *purpose* will determine the reading technique one uses with each reading of the article

relevance of the information presented. Secondly, he should judge a medical journal article for "scientific" soundness, and should use an approach such as the outline which appears on pages

Skimming an article may provide a capsule of information that one would like to peruse in depth at a later time or may

be sufficient for what one would like to know on a particular subject. Because one reads with a given purpose one day, it does not preclude his reading the same article with another purpose and using another reading technique when he re-reads the article another day. Developing a variety of reading skills can save a great deal of time and help one to keep abreast of the current medical literature. Perhaps if articles were written in a variety of formats, one could easily choose the pattern which would provide the material in the most appropriate "level" /4/ for the individual reader.

WRITING

Payne /4/ has suggested a system for preparing scientific and technical material in a series of patterns which may be individually chosen depending upon one's purpose. Payne /4/ proposes "five levels of abstraction" rather than the two normally written (the complete article for publication and the abstract). His "levels" are listed in TABLE III.

This system, Payne /4/ believes, would allow writers to say more, journals to print more reports of investigations, and readers to read according to their time, needs, and interests. For a nominal fee, each reader would be able to order from the publisher the "level(s)" he wished.

These levels are suggested to serve primarily the reading needs of scientists and physicians. In TABLE I these reading needs were described in terms of purpose and technique. Using the pattern of TABLE I, I am adding another column on the right so as to interpolate the level of abstraction (writing) which corresponds to the reading skills and purposes.

Glancing at TABLE IV, the reader can see that Levels III (Brief Description), IV (Summary), and V (Abstract) would be the highest in demand. One of these, or a combination of III and V, would normally appear in journals. Only a limited number of copies of Levels I (Personal Statement) and II (Extended Description) would be necessary. However, one may note that the only way to get insight into the investigation from the researcher's viewpoint is from Level I, and the only way to critique precisely the methodology is from Levels I or II.

TABLE III

PROFESSIONAL PAPER: LEVELS OF ABSTRACTION /4/

LEVEL	DESCRIPTION	COMMENT
I	Personal Statement	First person, diary-like, investigator's observations, inferences, thoughts
II	Extended Description	Depersonalized, complete with raw data, statistical analysis, figures, graphs, formally written narrative
III	Brief Description	Usually the article that would be published in journals, but one-half the length of articles now published
IV	Summary	More extensive than the present summaries attached to articles, but more condensed than Level III
V	Abstract	Written as it is currently, 150-200 words, placed at head of article (Level III), and in abstract journals

Writing these five different levels of abstraction may, on first impression, seem "like a lot of trouble"./4/ However, there are some compensating factors, as Payne /4/ points out; for example, the information (data) for Level I would have been gathered in a time sequence and the investigator was there. He merely has to "clean up" his log and write in first person as if he were telling the story of his adventure. After the full report is in written form, it is only a matter of reorganizing and depersonalizing so as to develop Level II. Each successive level is shorter, and writing in successively higher orders of abstraction may help to sharpen and crystallize one's thinking. Probably, the preparation of these five levels does not take any more time than revising drafts of one level of abstraction./4/ It is possible also that the writer does not get as tired of a paper by using this variety of writing techniques.

TABLE IV

APPROPRIATE LEVEL OF ABSTRACTION FOR READING AND WRITING

PURPOSE	READING TECHNIQUE	WRITTEN LEVEL /4/
General Information	Scan	III, IV, V
Scientific proof	Detailed critique methodology	II
Review of subject	Analyze major points	III, IV, V
Critique		
a. Publication	Evaluate	III, IV, V
b. Format	Use check list	III, IV, V
c. Insight	Read author's narrative*	I
Recall	Re-read abstract	V

*Suggested for the medical historian.

I have thought about the possibilities of using these five levels of abstraction and have tried to identify something similar at each level. Unless Payne's group in Boston or his students have applied the techniques, he gives no indication that there are samples available. "Logs" are possibly equivalent to Level I in draft form, and some technical reports border on Level II. Although Payne /4/ does not supply a word count for "brief" (Level III), I would surmise an article in the range of 500-900 words, plus tables and illustrations, which would appear on two to three journal pages. It is not unusual to see articles this brief in the IMRD pattern in some of our journals now, however, I wonder if these articles represent the comprehensive investigations implied by Payne /4/ which would be accompanied (preceded) by Levels I and II.

We can find some succinct articles which present the essence of an investigation, observations, and case histories. The Lancet has been notable for publishing these gems. We can find them in several other of the British journals, and I have been finding them recently in American journals, particularly the technique papers, as well as the case histories. The New England Journal of Medicine has given readers articles in proportion -- long ones (original investigations), reviews sometimes in several parts with inclusive bibliographies, and the "Medical Intelligence-Brief Recordings

Section". The Journal of the American Medical Association encourages reports of investigations and observations to be presented for comments and correspondence sections if the message is important but the details do not justify the space for a feature article. None of these (with the possible exception of some articles in The Lancet), as I interpret Payne's proposal, qualify for "Level III" although they are "brief descriptions".

Level IV has its place too. At this time many of the columns we see in print which qualify for the "long abstract" or summary are not initiated with intent -- instead they are the products after the editor has said "condense to X-number of words". If Level IVs were available to other investigators on standard-sized paper (i.e. manuscript size), these would be ideal for the researcher to have in a notebook beside his "log". He would have the vital information in more detail than given in abstracts, but more condensed and orderly than a collection of reprints of entire articles. Economically, this limitation in words would be feasible for the publisher and for investigators.

Level V, the Abstract, has become recognized as an integral part of published manuscripts. Abstracts head articles. They are published in abstract journals or sections of journals, are translated and are distributed by card index-abstracting services. Abstracts are valuable, particularly if they are written by the "PMRC" formula (purpose, methods, results, conclusions) /5/ and have the complete heading and accessories such as indexing terms. These give the reader quick insight into an article, and if they are on cards they are easily filed, effective for recall, and they give the information for relocating the original article.

Payne's proposal /4/ for investigations to be prepared in five levels may not be the optimum, as he admits, but these levels certainly are worthy of consideration as additional patterns in which investigations could be reported.

COMMENT

How to learn one's purpose for reading or for writing and which technique to select is an open-ended question. There are

many disciplining factors through the years which develop one's skills and help one define his purposes. The IMRD-patterned paper with a PMRC-structured abstract should, I believe, continue as the preferred framework on which to build the report of a medical and scientific investigation. Conscientiously learning to structure the report of an investigation on the five Levels of Abstraction, as proposed by Payne, is a suggestion which has merit especially as medical literature expands beyond one's capacity to read entire articles.

When one knows his purpose for writing, and selects his pattern he must realize that he has assumed the responsibility of communicating an idea, and that he has the obligation to present this idea in such a way that readers will receive it accurately and in the dimension that they desire. Leehy /3/ suggests four steps for the writer-communicator: (1) preparation -- prepare the reader to receive the new experience, (2) presentation -- set the pattern in his mind, (3) application -- help him by your experience to grasp a use for the knowledge or the methods, (4) test -- re-evaluate your own work.

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CRITICAL EVALUATION OF MEDICAL LITERATURE

MAJ Carl C. Peck, MC

Medical literature is composed of textbooks, monographs, newspapers, and journals. Textbooks and monographs represent one or several authors' interpretation of a field of medicine, derived from their own literature reviews and often biased by personal experience. The information in these forms of medical literature is not only a personal interpretation, but already two or more years old at the time of publication. While they serve a valuable purpose as an introduction to students, a handy reference for the occasional inquirer, and a ready (but "biased") bibliography, they serve with only limited usefulness to the physician-scientist. Newspaper articles may negate the time lag, but they are probably also biased. Frequently, they are written by nonphysicians, who, in an attempt to make the "story" dramatic, have not presented the facts in scientific sequence or perspective.

The medical journal comes closest of the various forms of medical literature to negating all the limitations cited. Journals are published weekly or monthly, and therefore the time-lag between derivation of the new facts and dissemination of information to the medical community is reduced (although still anywhere from two months to two years from time of submission to time of publication). Moreover, the content of medical journal articles is usually presented in such a way that the reader himself can make a critical evaluation of evidence proposed to support the author's thesis. The medical journal also serves as an instrument for continuous critical reappraisal of the body of medical knowledge and offers opportunity for confirmation and refutation of previously "established" facts. This is the embodiment of what Zimmerman and King /1/ have conceptualized as the "tentative nature of knowledge" referring to the "what is 'true' today may not be 'true' tomorrow" quality of present medical knowledge. While this "tentative nature

of knowledge" is disturbing to those seeking "permanence" or "absoluteness" of fact, it is characteristic of the "present state of the art" and must be reckoned with. The medical journal retains primacy as the forum for this continuing debate and development of medical science.

Need for Critical Evaluation

If we could believe everything we read in medical journal articles and leave it up to the author or the editor for assurance that each article is valid in all respects, then we would need only find a solution for digesting the volume of studies published. In fact, all that would need be printed would be the results and conclusions -- the rest of the article could be omitted. However, such is not the case as you, the reader, know from your own experience in reviewing articles.

The critical reader of this article may desire proof of the verdict hinted at above. Unfortunately, there is surprisingly little self-analysis of the "quality" of current medical literature. A thorough literature search, including a MEDLARS analysis, revealed only five published evaluations of the quality of medical journal articles. The earliest report concerned the "adequacy of control groups" in 100 randomly selected articles from five frequently read medical journals (Journal of the American Medical Association (JAMA), American Journal of Medicine, Annals of Internal Medicine, Archives of Neurology and Psychiatry, and American Journal of the Medical Sciences). TABLE I reveals the results of Ross' analysis. /2/

TABLE I

ROSS REPORT /2/

CONTROLS	ARTICLES *(percent)*
None	45
Inadequate	18
Control impossible	10
WELL CONTROLLED	27

In 1961, Badgely /3/ reported an evaluation of 103 articles taken from the Canadian Medical Association Journal and the Canadian Journal of Public Health. He examined the articles for a number of characteristics considered essential for scientific reporting. TABLE II shows little improvement, at least in regards to the use of controls, from Ross' data of 10 years earlier.

TABLE II

BADGLEY REPORT /3/

CRITERION	ERROR	ARTICLES *(percent)*
CONTROLS	None, Inadequate, Impossible	74.9
DEFINITION OF TERMS	Not explicit	17.5
SAMPLING	Inadequate or inapplicable	89.2
STATISTICAL TECHNIQUES	Inappropriate or Additional analysis required	57.3
CONCLUSIONS	Errors in statistical inference	41.5

Schor and Karten /4/ reported in 1966 a systematic examination of the following ten journals: Annals of Internal Medicine, New England Journal of Medicine, Archives of Internal Medicine, Archives of Surgery, Journal of Clinical Investigation, American Journal of Diseases of Children, Surgery, Gynecology and Obstetrics, Archives of Neurology, and Archives of Pathology. Three issues of each journal were selected from the first three months of 1964. The sole basis for their judgment was "validity of conclusions drawn in terms of the design of the experiment, the type of analysis performed and the applicability of the statistical tests used or not used." A total of 295 articles were subjected to evaluation. A list of twelve errors was developed in the course of the investigation, and each study was examined as to presence, absence, and potential for elimination of error. On this basis they found that the journals had mis-identified 49.5 percent as "analytical" studies which were in actuality case descriptions! Of the remaining 149 analytical studies 72.5 percent were rejected, that is, the conclusions were not supported by the accompanying data. Only 27.5 percent were considered

"acceptable". Five percent were termed "unsalvagable", i.e. the problems posed by the investigator could not possibly be solved by the kind of studies described. None of the journals had more than 40 percent "acceptable" studies.

A more recent report was prepared by Schoolman et al (1968). /5/ These statisticians from the Veterans Administration Biostatistics Research Support Center reviewed 202 articles in 12 consecutive "recent" issues of the Journal of Laboratory and Clinical Medicine. They focused on the situations in which "some test of statistical significance was used from which an inference of causality was made." Among other disturbing revelations, their evaluation when applied to the issue of randominzation revealed 63 percent "Open to question", 29 percent "Obviously impossible", and only eight percent "OK".

The most recent report, although too brief, from which to glean much detail, is one concerning four unnamed British medical journals published during the first six-month periods of 1966 and 1969. Hornheimer and Lionel /6/, Department of Pharmacology and Therapeutics, London Hospital Medical College, assessed the "experimental design" in therapeutic drug trials. They scored 83 percent and 46 percent "acceptable" for the weekly and monthly journals respectively. Moreover, they reported an "improvement" in this respect between 1966 and 1969, but did not quantitate this.

The studies just described present a dismal picture of the scientific quality of current medical literature if they are representative of the whole of the present body of medical journal articles. That editorial policy can upgrade the situation was shown by Schor/7/, in cooperation with the Editors of JAMA, in an experimental program. Manuscripts were analyzed according to their list of potential errors and returned to the author as "acceptable", "rejected", or "in need of revision". Accepted and once-revised manuscripts were then eventually published. In the first 1½ years of the program, the following decisions were made upon the 514 submitted manuscripts (originally judged "medically acceptable" by the Editors): 26 percent acceptable, seven percent not salvagable, and 67 percent revisable. One hundred and sixty-one manuscripts were eventually published. Of these 74 percent were considered acceptable, while 26 percent were still in need of

revision. This represents an improvement of 48 percent from 26 percent acceptability for first-submitted contributions to 74 percent. The reason they did not approach 100 percent was the failure of the editors to resubmit revisions for statistical review.

This experiment suggests that if the journal, its editors and reviewers conscientiously assumed the responsibility to accept, reject, or require revision of all articles, the quality could be improved. This is undoubtedly done to some extent by most journals, but apparently it is not done in 100 percent of the journals, 100 percent of the time, or to the extent of 100 percent acceptability. That the responsibility is not borne by the investigator himself is also painfully obvious. Thus, at least for the present, a large portion of the burden of judgment is placed upon the reader.

BASIC APPROACH

Before considering specific errors commonly found, the concept of objectivity in critical review should be considered. The foregoing studies leave one justifiably skeptical of medical journal articles. Certainly, an element of doubt is a healthy attitude when evaluating a study. The attitude of "make the investigator support his conclusions with valid data" is proper. However, misuse of the principles about to be reviewed can lead to equally unscientific thinking. That is, to reject any study which does not conclude in accordance with one's previous opinion and to conjure up all the potential errors as support -- is bad form! It is true that if one is critical enough, nothing can be proven with absolute certainty. However, the statistical method allows one to make decisions of credibility based on probability statements about the influence of randomization versus cause-effect association. In other words, one must attempt to be objective about a conclusion if it can be reasonably supported by valid evidence even though it does not conform to his prior opinion. Confirmation and the test of time will ultimately reveal the true state of affairs.

The list of common errors in current medical journal articles appearing in TABLE III is derived primarily from the previously described studies on "quality" of medical literature. A bit of explanatory information will help to clarify each point.

Mis-identification of study-type. Proper identification of the study-type is critical for valid use of the statistical method and degree of credibility one can assign conclusions of cause-effect emanating from a given study. TABLE IV is an attempt at ordering by article-type, the least-to-most credible cause-effect conclusions they report. The basis for the ordering is the quantifiability of the potential errors.

TABLE IV

THE MEDICAL JOURNAL ARTICLE
Order of Credibility Regarding Conclusions of Cause-Effect by Study Type

		POTENTIAL ERRORS	QUANTIFIABILITY OF ERROR
LEAST TO MOST CREDIBLE	Editorial	O	–
	Review	O+	±
	Case Study	P	±
	Series, Survey	P, S	±
	Retrospective Analytic Study	P, S, C	±
	Prospective Analytic Study	R, I, II	+
	Experiment	M	++

O = Opinion
P = Post-hoc-ergo-propter-hoc fallacy
S = Sampling error
C = Lack of (-) or inadequate control
R = Randomization
I,II = Type I, II errors
M = Measurement error

TABLE III

COMMON ERRORS APPEARING IN CURRENT MEDICAL JOURNAL ARTICLES

Mis-identification of study-type (review, editorial, case description, survey, analytic study).

Proper identification of the study-type is critical for valid use of the statistical method and degree of credibility one can assign conclusions of cause-effect emanating from the study.

Inadequate definition of problem

Absence of clear statement of the problem to be studied; nonadherence to the stated problem; too much under the study problem.

No statement of sensitivity, specificity, or accuracy of a measuring instrument

Sensitivity = percent of "cases" detected by a measurement (true positives)
Specificity = 100 percent minus the percentage of "non-cases" registered as "true cases" by the instrument
Accuracy = (reproducibility) degree of variation exhibited by an instrument when applied repeatedly to the same standard

Improper application of a test of significance

A significance test is applicable only if the assumptions underlying it are met by the manner in which the experiment is conducted. The basic assumptions which underly the use of any such test are:

Prior commitment to a precise testable question
Randomization
Adherence to preselected risk of making a Type I (defined below) mistake

Beyond these requirements each test is justified only when experimental conditions meet the special assumptions used to derive the specific test.

Improper conclusions drawn as the result of application of a statistical test

Lack of understanding of the meaning of the term "statistical significance"
"Cause" and "effect" cannot be proven by statistical methods or a significance test

Post-hoc-ergo-propter-hoc fallacy

Absence of a control group when a control group is necessary to obtain valid conclusions. (The fallacy of confusing consequence with sequence.)

Type I error: accepting a result as effect of the treatment, when in truth it occurred as a result of the randomization procedure

Type II error: accepting a result as due to randomization, when in truth it occurred as a result of the treatment

Misleading tables and charts

Inadequate labeling of numbers (scales) and limits
Lack of basic information in a summary statistical table so that the reader is able to reconstruct the statistical methods (tests) applied
Lack of purpose or derivation of line on scattergram
Presentation of data for one case so as to imply "typical" data

One of the fundamental characteristics of science is quantification. Even uncertainty can be dealt with as long as it can be quantified. Probability theory is an attempt at quantification of uncertainty arising from randomization bias. Other techniques for error-quantification include sensitivity, specificity, and accuracy limits.

Thus, editorials and reviews appear least credible from a purely scientific standpoint. These article-types are basically statements of opinion by one or several authors and their interpretations of a field of literature in light of their own experience. Unless one accepts the arguments on the basis of "authority" alone, i.e. "he knows more than I do and so I must believe him", the proof must lie in the studies he refers to. Clearly, the potential error in opinion cannot be approached by quantitative methods. The ± quantifiability score given to the review article refers to the possibility of reviewing the same literature reported on by the review, thus "evaluating" his review.

Cause-effect statements concluding from a case study or series or from a survey without controls suffer the potential of the "post-hoc-ergo-propter-hoc" fallacy. Although strictly speaking this error cannot be quantitatively assessed, its possible contribution to an all-or-none sense can be appreciated. The credibility of surveys, in addition, depend upon the sampling technique and the potential biases inherent therein.

Retrospective studies which use controls are termed retrospective analytic studies and are as good as the freedom from bias that can be demonstrated in the sample and the control group. Certainly, sampling tehcnique and post-hoc-ergo-propter-hoc reasoning are at risk in these studies also.

Prospective analytic studies are more credible because, if the randomization procedure is done properly, then the risks of Type I ("p-value") and Type II errors can be quantitated. (pages

An experiment is a situation in which all variables are known and only one variable is allowed to differ between two study groups, in all other characteristics they are identical. Although these situations are possible in

the physical sciences, clinical medicine is characteristically devoid of such simple situations. It is included in this scheme for completeness and perspective. In an experiment, possible errors can be calculated generally from the sensitivity, specificity, and accuracy characteristics of the measuring instruments.

Inadequate definition of problem. It should be made crystal clear in the introductory statement just what is to be studied. Consideration of more than one or two problems usually reflects poor experimental design. Also introductions which contain vague statements of the subject generally turn out to be confusing reports. The subject for the study stated in the introductory paragraph(s) should be the same as the subject in the conclusions. Conclusions which extend beyond the scope of the stated subject imply either non-adherence to the original study design or speculation. It must be recognized that most authors cannot resist the temptation to weave their study conclusions into the general conceptual framework of existing accepted medical knowledge. This is not bad in itself, but the reader must recognize where the data-based validity of a fact ends and the speculation, generally based on arguments referring to bibliography, experience, or theory begins. A good exercise for the reader is to try to formulate a brief statement about the study after reading it once; and if this cannot be done with ease, then this error -- inadequate definition of the problem -- has probably been committed.

Statements of Sensitivity, Specificity, and Accuracy. Sensitivity is a measure of an instrument's ability to recognize "true cases". Specificity is a measure of the instrument's ability to register "non-cases" as such. To exemplify these measures, a recent lead article in the Annals of Internal Medicine (February 1971) may be cited. The authors of this article presented data supporting the thesis that in their group of angiographically proven cases of pulmonary embolism, the lung scans were all positive and the PO_2 was always less than 80 mm Hg. Thus the sensitivity of the combination of tests in detecting pulmonary emboli is 100 percent. However, closer examination of their data reveals a group of patients whose pulmonary angiograms were negative for pulmonary emboli. Among these, 77 percent had positive lung scans and 42 percent had a PO_2 of less than 80 mm Hg.

Thus the specificity, that is, the number of "non-pulmonary emboli cases" detected by lung scans and PO_2s is so poor that the tests have questionable diagnostic value. (In order to put specificity on a scale from 0-100 percent, it is usually defined as 100 percent minus the percentage of "non-cases" registered as "true cases" by the instrument. In the article cited, specificities of 23 percent and 48 percent would be obtained.)

Accuracy is a parameter better suited to "continuous measurement". The importance of this characteristic is illustrated by the following. Suppose a drug is given to a patient whose hematocrit (Hct) is 30 percent before therapy, and when measured after injection of the drug, the hematocrit is 33 percent. One might conclude that the drug was responsible for the apparent rise (three percent) of the hematocrit. If, however, when it is ascertained that the given laboratory measuring the hematocrit usually varies $\pm$ Hct points on the same standard in repeated trials, then the three percent difference has little meaning because this value lies within the inherent variability of "accuracy" of the instrument.

Improper application of a test of significance. Prior commitment to a precise testable question should be self-evident. However, this principle is not uncommonly violated. Such an example is that of an investigator who sets out to measure parameters of efficacy and toxicity of a particular agent, who "also noted a higher incidence of diabetes in the treatment group ($p < 0.05$)" and attributed this to the drug! Obviously, the greater the number of parameters "also measured", the greater will be the number of associations effected by randomization, but erroneously not interpreted as due to chance. At best, "also noted" associations serve as ideas for future studies but in themselves are not to be taken as well-established facts.

The issue of randomization is critical and, as pointed out in the Ross study, this error is often, if not blatantly, committed, insufficient information is given by the investigator to establish that his samples were truly randomized. "Randomization" is defined as the process of selection by which each member of a population has equal opportunity for being included in the sample. We cannot examine this issue in detail in this paper, because of its great scope (there

are many books devoted to this subject alone). An elementary concept of what randomization is and how random samples can be obtained is essential for the reader of current medical literature in order to be able to judge the literature he reads from this angle.

Adherence to preselected risk of making Type I mistake* is a third basic requirement in application of a test of significance. The general principle may be illustrated thus: if an author states that he wished to utilize the level $p < 0.05$ as his limiting value of significance but his study detects $p = 0.1$, and then the investigator admits this is evidence of the unlikelihood of chance variation, then his study is termed negligent for this item.

Knowledge of the specific use of each test for specified experimental designs is essential. Examples of error in this area are (1) use of chi-square analysis when the theoretical frequency in each cell is less than five, (2) use of chi-square on continuous data or percentage, (3) testing of differences between means rather than the mean differences against zero in a paried study. (A statistician may need to be consulted for questions of valid statistical analysis in complex cases.)

Improper conclusions drawn as the result of incorrect application of a statistical test. A result is "statistically significant" if the odds of this having occurred by chance are less than a predetermined value (commonly $p < 0.05$, i.e. less than one in 20). This does not mean, as some authors remark "I'm 95 percent confident that my results are valid."

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*Type I mistake is defined as accepting a result as due to randomization, when in truth it occurred as a result of randomization procedure.

†For a more detailed discussion of this subject, read the article in this issue entitled "The Almighty P-value" pages

It must be appreciated that "cause" and "effect" cannot be proven by statistical methods or a significance test. At best, statistics can provide a statement of the probability that a given result occurred by chance. Beyond that, other factors must be considered. For example, other data and logic must help delineate the direction of causality between two highly likely related events, A and B. Figure 1. Relationship in time [a consideration helping to define direction (A occurred before B), and speed (how soon after A does B occur)] will have some influence in determining causation. Finally, presumed cause-effect relationship between A and B may be confirmed by independent methods and demonstration of supporting negative associations. (This is one of the arguments for the value of confirmation studies and for reporting negative studies.)

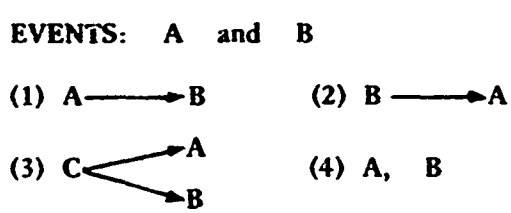

Fig. 1. NATURE OF ASSOCIATION with respect to causation. (1) A caused B. (2) B caused A. (3) C caused both A and B, or (4) A and B occurred, totally unrelated with respect to causation (i.e. "coincidently").

In the final analysis, the philosophers of science tell us "cause-effect" can never be absolutely proven. However, being men of medicine and of practicality, the decisions we are forced to make necessitate an ultimate belief in cause and effect.

The post-hoc-ergo-propter-hoc fallacy. This is one of the most common errors in logic made by physicians and, for that matter, by everyone. An example of such a fallacy in reasoning is the following. If a physician is presented with a sick patient, and the physician treats him and the patient gets better, then the physician may conclude that the patient got better as a result of this treatment. This may not be scientifically valid, especially if the patient had a self-limited condition or disease which tends to remit spontaneously. Without prior knowledge of the natural

history of the disease (untreated control), one cannot eliminate the possibility that the patient may have gotten better without the treatment. A control group is necessary to define the course of untreated patients so that a valid comparison can be made regarding the effect of the treatment.

Type I Error. This is the statistical term for a type of error in interpretation of data. It means that the investigator accepts a result as an effect of the treatment, when in truth it occurred as a result of the randomization procedure. To illustrate this, suppose a sample is randomly subjected to a treatment which in reality has no effect. However, "by chance" the outcome is such that the "treatment" group is much different from the "control" (untreated) group in terms of the measurement of interest (designed to detect the effect of treatment). The probability of this occurrence can be calculated and is identical with the "p-value". Usually, if the p-value (or risk of Type I mistake) is below a certain value, (for example, $p < 0.05$) then the outcome is decided in favor of the treatment effect. Of course, an author should never know when he is committing this error, because if he is aware of it, he should decide in favor of chance instead.

> Because of the overwhelming Worship of the Almighty p-value, editorial policy may be working against us. Schoolman et al /5/ discussed the problem in their analysis of studies. They suggest that comparison investigations (drug effectiveness, laboratory methods, et cetera), in which large true differences are found, are likely to get published. In these (where $p < 0.05$), conclusions are uniformly never decided in favor of chance. However, studies in which $p > 0.05$ are either not submitted for publication by the author, or if submitted are not accepted by the editors. If such a question being tested is important, more than likely it will be repeated by different investigators. At this level of significance, in one out of every 20 investigations a researcher should detect a "significant difference" (in reality due to chance), but will interpret it as a "real difference" (a Type I mistake). Thus, present publication policy (requiring studies to show $p < 0.05$) may tend to encourage erroneous interpretation of experimental data!

Type II Error. A Type II error is just the opposite of Type I. It means that the investigator accepts a result as due to randomization when in truth it occurred as a result of the treatment. This error may be committed much more frequently than most investigators and readers appreciate. For each time a result fails to reach "statistical significance" it is usually decided in favor of chance. However, failing to attain a certain predetermined level of significance does not "prove" that the result occurred by "chance". Rather, all it reveals is that the differences detected were sufficiently small so as to make the probability of its chance occurrence greater than the predetermined acceptable probability of 0.05 or less.

Quantification of Type II errors, that is, determining the risk of committing such an error, requires posing the following question. If the real difference is such and such, what is the probability that for a given sample size, the difference will fail to be detected. The probability number generated from this kind of correlation gives one an idea of how likely his experiment is to detect a real difference when it exists. Although only rarely reported in medical journal articles, this statistic is clearly a useful one.

Perhaps conceptually an even more useful statistic is the so-called "Power of Experiment". This is nothing more than one minus the Type II error. The advantage of this term is that it expresses the "power" or sensitivity of an experiment in terms of a 0.0—1.0 scale — the "power" to detect a difference when it truly exists.

Misleading tables and charts. The list which appears in TABLE III is self-explanatory.

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A SUGGESTED APPROACH TO MEDICAL JOURNAL ARTICLE ANALYSIS

MAJ Carl C. Peck, MC

The following is proposed as a rapid method for judging critically a medical journal article for "scientific soundness". The method is based primarily on recognition of the presence of the common errors.* The bold headings below refer to the sections of the article under scrutiny. Applicable comments and questions follow each heading. A little practice will enable the reader by his own critical evaluation to rate quickly and accurately the credibility of an article.

Title

1. Subject of the title. To read or not to read on, that is the question! There is no use cluttering up your mind with data, results, and conclusions which are probably 73 percent† unreliable anyway, if you are not interested in the subject of the study. Therefore, decide whether or not the subject stated in the title interests you or if you have use for the information. (It must be mentioned that some authors do not title their articles in such a way so as to reflect the content of their reports. In those journals which include an abstract immediately below the title, you have additional information included therein which will aid in the decision to continue reading. If one disagrees with the conclusions in the abstract, one must be careful to keep an open mind and to analyze critically, and particularly objectively, so that his final decision is not based on his initial disagreement but on the merit of the investigation. Without this awareness and ability, one has an unobjective decision basis which results inevidently in an unscientific bias in the understanding of medicine.)

2. Classify the *type* of investigation (*editorial, review, case study* or series of cases, *a retrospective* or *prospective analytic study*).

a. Editorials and Reviews are opinions based on experience and knowledge. The review digests a literature search of supposedly established facts and presents data from various sources. Note the biased nature of this type of information.

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*Peck CC: Table III and accompanying explanation. Critical evaluation of medical literature. *Pres Conc Intern Med* Vol IV No 11, November 1971, p 1007 and pp 1005-1014.

†Zimmerman JM, King TC: *J Med Ed* 41:258-262, 1966; also, Schor S, Karten I: *JAMA* 195:1123-1128, 1966

b. Case study (or series of cases). This is a simple presentation of a patient (or patients) with history, physical and laboratory findings, supposed response to treatment, et cetera. There is no attempt at "statistical analysis" and there should be no generalization beyond known cases. Beware of post-hoc-ergo-propter-hoc reasoning!

c. Analytic study. A group of patients or materials are subjected to standardized procedures of selection, supportive care, and treatment. The methods should be reproducible. The data are analyzed by statistical methods The reader should be able to reconstruct the tests applied.

Authors

1. Look at the authors' names. Are they famous? Be realistic – well-known researchers often have their manuscripts examined much less critically before publication than new upstarts. It is this phenomenon that has resulted in an occasional blunder in the medical literature. Do not confuse "authority" with "authenticity" and "validity". (Often the "famous" author had little or nothing to do with the investigation but is listed by virtue of his being chief of the department, head of the residency program, or some responsible position in the laboratory where the investigation was conducted.)

2. Look at the footnotes which state positions of the authors and their centers of investigation. Avoid being too impressed. *A study should stand on its own design and results, not on the investigators' reputations or affiliations.*

Introduction

Often in the introduction, previous studies will be cited to serve as a basis for the new study presented. The "facts" presented may be "well-documented", but if anything strikes you as subject to question, then it is wise to go to the references cited and examine them for *quality* (minimize the quantity). This, of course, necessitates pulling references in question and subjecting them to similar critical analyses. Another characteristic of these first paragraphs is the statement of purpose. It should be clear from reading this section exactly what the subject is, the limits of the problem, and the purpose (focus) of presentation. (Then compare this with the results and conclusion sections. Did the authors stick to their originally intended study subject?)

Methods and Materials

1. Examine the composition of the sample(s), the definitions, the sampling

procedure used. Is the methodology described so that it could be reproduced by another investigator?

2. Were statistical tests for significance to be applied? If so, were the samples truly randomized? Is the preselected risk of Type I error‡ stated?

3. Examine measurement procedures. Are there statements of sensitivity, specificity, or accuracy?

4. Is the experiment designed properly to answer the question proposed?

Results

1. Are data, tables and graphs easy to understand and labeled properly? Is enough information provided to reconstruct the tests of significance which are used?

2. Is a comparison made? Look for controls. Is the post-hoc-ergo-propter-hoc fallacy committed?

3. Are tests of significance applied properly? Were statisticians consulted (Beware that even they may err. . .)?

4. Are new data presented not expected from the subject-problem as stated in the introduction?

Conclusions

1. Are explanations for cause-and-effect statements proposed? If so, can such statements be justified on the basis of the investigation?

2. Is there generalization beyond known cases? Can this be justified? Distinguish between this and "imaginative speculation".

Bibliography (References)

Look at its size. Evaluate its quality.

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‡Accepting a result as effect of the treatment, when in truth it occurred as a result of the randomization procedure.

FINAL JUDGMENT

Are the Conclusions Justified on the Basis of . . .

(1) the design of the experiment,

(2) the type of analysis performed,

(3) the applicability of the statistical tests (whether used or not)?

THE ALMIGHTY P-VALUE
OR THE SIGNIFICANCE OF "SIGNIFICANCE"

MAJ Carl C. Peck, MC

Today a medical journal article can hardly be accepted for publication without the data being lavishly garnished with referrals to "$p < 0.001$". These statements of statistical "significance" have obtained an almost mystical power, as if in themselves capable of establishing the "truth" of the data to which they pertain. The true meaning and utility of these statistical maneuvers, however, are widely misunderstood, by authors, editors, and readers. Such tests of significance are applied sometimes when it is inappropriate to do so, as well as at times when it is an inappropriate test for the circumstance. Since the ultimate validity of a medical journal article must be assessed by the reader himself, it is mandatory that he understand the significance of "significance".

Statistical "Significance"

A test of statistical "significance" is a mathematical operation applied under special circumstances to data generated from manipulation of a sample. In medicine, we are most frequently faced with the question of the relationship between two events, such as the course of a disease in treated and untreated groups. Significance tests are designed to estimate the frequency of which similar results could have arisen as a result of chance alone.

The outcome of a test of significance is described as a "p-value", numerically a decimal between 0.00 and 1.00. The proper interpretation of a given p-value (for example, $p < 0.05$) is the following: assuming that the samples were properly randomized and that the test appropriate to the data was applied, then in less than one of twenty times, these results would have been generated not as a result of any difference in treatments but as a result of the

randomization process itself ("chance"). (It does not mean, as some authors quote, "I am 95 percent confident that my results are correct.")

"Significance" in the statistical sense simply describes a way of assigning a number to the influence of randomization. It does not have any implication to the true significance of the data with regards to truth, validity, or importance.

"Non-significance" in the Statistical Sense

Suppose a test of "significance" is applied to a set of data and found to be "non-significant", that is, the p-value lies outside predetermined limits, for example, $p > 0.10$. The proper interpretation of this circumstance is the following: the probability that the results occurred as a result of chance alone are greater than one in ten; not that the results definitely occurred as a result of choice; but rather that chance's accounting for the results is higher than is generally acceptable.

"Non-significance" in the statistical sense is unrelated to "truth" or "importance". As one can easily appreciate, it might be exceedingly important to show that two events have a high likelihood of occurring by chance. However, these data are not popularly reported. Some have suggested an interesting but frightening potential consequence of the effect of an editorial policy which discourages reporting of "non-significant" results.*

COMMENT: Actually, the acceptance or rejection of these estimations of the influence of randomization represent another decision. There is no magic p-value below which the likelihood of chance variations is so low as to be absolute proof in itself of the "non-influence" of chance. However, the levels of $p < 0.05$ and $p < 0.01$ or $p < 0.001$ are commonly accepted values which represent a level below which most scientists agree that chance is unlikely to be responsible for the outcome. The decision-making process described is formalized by statisticians and called the "Null hypothesis",

*Schoolman HM, Becktel JM, Best WR, et al: Statistics in medical research principles versus practice. *J Lab Clin Med* 71:357-367, 1968.

"Type I Error", and "Type II Error". These designations are not necessary for understanding the concept of significance testing.

When are tests of significance necessary?

In a true experiment, where all variables are known, and all but those under study can be held constant, chance variation will not influence the outcome and thus estimates of its influence are not necessary. Medical science is, however, far from the capability of identifying, much less controlling, all variables which influence "medical" events. Thus medical phenomena, especially course of disease, are subject to many factors, some known, most unknown, which result in considerable variability.

One way of dealing with such variable phenomena when the particular influence of a single factor (treatment) is to be studied, is to mix up the comparison groups in a fashion designed to "dilute", in some fair way, those indeterminate influences. Such mixing procedure is called randomization defined as a process by which each member of the population has equal opportunity for inclusion in the sample. It should be noted, however, that even "fair mixing" will occasionally result in samples with uneven distribution of factors. The utility of the tests being discussed is that under these circumstances, the likelihood of these "uneven" distributions can be quantified.

When are tests of significance not necessary?

Circumstances arise when it is obvious that although a test may be applicable, it is utterly unnecessary to apply it. Suppose a sample of 50 patients with disease X are randomized into two groups. Group A receives no treatment but Group B receives an experimental drug. All of the Group A patients die of their disease in two weeks, but the entire Group B is alive 20 years later. Such large differences intuitively defy the question of the chance of it having occurred unrelated to the treatment and thus application of a test of significance is superfluous.

Another example would be when an outcome could be predicted to describe the total non-influence of the treatment. Thus, if one-half of each group died leaving no difference between them, a test of significance would be unnecessary.

Few occasions in medical research present like the first described. Insulin for the cure of early recognized diabetic ketoacidosis may represent an example in which a significance test was obviously unnecessary. Incidences of the latter circumstance, in which differences are small or non-existant are so frequent that they do not require example.

COMMENT

Significance testing with the generation of the "Almighty p-value" is upon us. As currently used in the medical literature, it is true that "significance" is frequently misunderstood. Understanding of the conceptual basis for these statistical operations can make more valid and realistic the conclusions derived from data. Correctly interpreted, then, the significance of "significance" makes its limited but useful contribution.

(The above statements are "true" by definition. No test of significance is applicable. Argument: by "authority"...)

STRATEGY OF SEARCH

A Survey of Indexes in the Medical Library and a Description of Search and Retrieval Techniques

Mary Elsie Caruso, *Librarian, Medical and Biological Sciences*

Since the amount of information now available, and necessary, for proper patient care has grown far beyond the ability of any person to carry in his head, some educators have emphasized that teaching a student how to find, not recall, needed information is more important. It has even been suggested to eliminate almost all memory efforts and to depend on the student's capacity to define problems, to find and use knowledge effectively as the most important qualities to develop. Even a superficial survey of the quantity and variety of indexes and abstract tools available indicates that the information in print has grown far beyond the ability of any person to carry all that knowledge in his head.

Therefore, it is the purpose of this survey of indexes, and the description of the use of INDEX MEDICUS in particular, to provide an outline on how to find what you want when you want it. The search and retrieval capabilities of the Letterman General Hospital Medical Library will also be enumerated.

THE INDEXES

All journal indexes have basic elements in common. The introduction in an index outlines its scope. A list of journals indexed will be included frequently in full title and in an abbreviated title alphabet. Journals indexed "selectively" will be marked. This means that only the articles contributing to the scope of the particular index will be included (in contrast to the main list in which all articles in a given journal are cited in the index). Journal titles recently added to the index or deleted will also be indicated.

Most medical libraries have the following journal indexes which I will list chronologically:

INDEX CATALOG OF THE LIBRARY OF THE SURGEON GENERAL'S OFFICE

An unusually complete set of some 60 volumes listing all the reports, monographs, meetings (both international and local), pamphlets, and a wealth of medical information not found in any other index. The references date from pre-Civil War days. No "first case" report article should be written until this index is consulted to be certain that the case was not described earlier and already reported. Our Medical Library is fortunate to have the complete set of INDEX CATALOG.

INDEX MEDICUS, 1879-1926

(For the years 1900-1902, the American medical literature was indexed only in the French index — BIBLIOGRAPHICA MEDICA.)

QUARTERLY CUMULATIVE INDEX, 1916-1956

CURRENT LIST OF MEDICAL LITERATURE, 1941-1959

INDEX MEDICUS, 1960 to date

OTHER indexes in medicine and science

Science Citation Index, 1964 to date, is an international, interdisciplinary index to the literature of science, medicine, agriculture, technology, and the behavioral and social sciences. In 1966 the Permuterm Subject Index was added. This is a permuted title-word index.

Current Contents is a weekly guide to the literature in three areas (Life Sciences; Behavioral, Social and Management Sciences; and Agricultural, Food and Veterinary Sciences).

Excerpta Medica, which we have in all the sections, present abstracts of the literature.

INDEX MEDICUS

The INDEX MEDICUS in its present form appeared in 1960 when the National Library of Medicine began computer storage and retrieval. Retrieval is available to researchers now from 1964 to

date through Medical Literature Analysis and Retrieval System (MEDLARS).

Each yearly volume of INDEX MEDICUS includes the following six parts:

— Introduction delineating the scope.

— List of journals indexed, titles deleted and new titles added.

— Bibliography of Medical Reviews. These are recent review articles retrieved from the main INDEX MEDICUS.

— Medical Subject Headings (MeSH). The cumulation appears with each January issue. Added and deleted terms are noted in each monthly issue of INDEX MEDICUS. Each bound volume of INDEX MEDICUS includes a complete list of the current subject headings. This list is vital to successful retrieval of references whether retrieval is performed manually or by computer, such as AIM-TWX, Medline, or MEDLARS.

— The Main Index of References. This includes two sections: a Subject section using the MeSH terms, and a section of Author listings. The latter gives the correct form of citation to quote in a bibliography if the journal specifies Index Medicus format.

— Monthly Issues of INDEX MEDICUS. In addition to the subject and author sections, these include a list of bibliographies which are reprints of literature searches made in response to requests from individual physicians, scientists, and other health professionals. Single copies of these searches may be ordered at no charge. Instructions for ordering are given in preliminary pages of INDEX MEDICUS.

THE SEARCH TECHNIQUE, Step-by-Step

Define the problem to its most specific elements.*

Search MeSH for the terms most specific to the problem. MeSH has two listings — the main one is alphabetical and each term is followed by an alphanumberic code which refers directly to the categorized list for the most specific terms for the search.

Find the term selected in the subject section of INDEX MEDICUS.

From the references listed, select those references that meet the solution of the problem as defined in the first step.

(When searching through the subject section, take note of the following aids which will save time on the search: (1) Each main subject is subdivided into pertinent categories, for example, a disease entity is divided into Etiology, Pathogenesis, Treatment, Complications, and so forth. (2) Each citation under the main heading or one of the subdivisions is listed alphabetically by the name of the journal in which the citation appeared. (3) Foreign language citations are marked by the language code and are listed separately under each main heading and subheading. English language journals lead each subsection, followed by French, German, Japanese and the others.)

Copy each citation on a LGH Form 640 (Bibliography Card). (These cards are available in the library. They are 5 x 8 inches and the backside is blank which is handy for taking notes about the article. They are convenient for one's personal reference file.)

Check the journal holding list (Kardex) to see if the journal desired is in the Letterman Medical Library collection. If it is, pull the volume from the shelves and read.

*An excellent preliminary step before beginning the search as outlined here is to become familiar with a recent review on the subject. If one is available, it will be listed in the Bibliography of Medical Reviews, INDEX MEDICUS. The review will help one define the problem and delineate the scope of his subject.

(For references in journals not available in our Medical Library, enter the source on the Bibliography Card and leave it with the Librarian for inter-library loan service. The Letterman Medical Library has literally no limitations regarding its retrieval of needed references. Twice weekly runs are made to the well-stocked library at the University of California Medical Center. Other sources are California Academy of Sciences Library, Lane Medical Library at Stanford, and other libraries in the San Francisco Bay Area. By mail or telephone, almost any library in the United States is approached for references not available locally.)

COMPUTER RETRIEVAL

Service is the objective of the Medical Library. The service has been expanded to computer retrieval of bibliographies. Access is being provided through the (1) AIM-TWX (Abridged Index Medicus-Teletypewriter Exchange), (2) MEDLINE (MEDIARS On-Line), and (3) the "mother" of these two, MEDIARS.

AIM-TWX

An on-line computer system available daily, with up-to-date references from journal literature in the fields of medicine and toxicology. The data base covers five years of the 100-125 most frequently used English language journals in those fields. AIM-TWX is scheduled to be phased out in the latter part of 1972 and to be replaced by MEDLINE.

The AIM-TWX with its rapid search capability has been available at Letterman since September 1971. Following definition of the search problem and a preliminary look at MeSH, the Librarian is consulted. When an AIM-TWX search is appropriate, the MeSH are fed into the system from the computer terminal located in the Library. If there is a "hit", the bibliography will appear in print-out form from the terminal within five to ten minutes, unless the list of references is greater than 25, in which case it will be mailed to the requestor within two days. In the first three months of use, over 207 searches were made, and thereby retrieving hundreds of pertinent references almost immediately. Manual retrieval for the same number of searches would take months.

MEDLINE

MEDLINE is also a computer-based system of retrieval. Presently the references come from 239 medical journals indexed for MEDLARS since 1 January 1969. The base will be expanded to include over 1,000 journals. Access is projected for early 1972. Our Medical Library expects to offer service on MEDLINE.

MEDLARS

MEDLARS retrieves from over 2,500 medical journals indexed for INDEX MEDICUS from 1964 to the present. This service is available for exhaustive searches in preparation for research. Our Medical Librarian will assist physicians and other members of the staff with preparation of the MEDLARS Search Request forms and the processing of these forms.

COMMENT

The Medical Library is the single most important learning center providing information services for medical personnel. The steps listed in this paper are only basic steps in information gathering.

Indexes are proliferating as fast as specialties develop. For the researcher to use the indexes, even the number available in as small a library as the Letterman General Hospital Medical Library, he requires the assistance of the "expert" in information retrieval, the Librarian — the Information Specialist (even her title is changing!).

Our Medical Library has over 30 indexing sources for gathering information. If these sources fail, the Librarian is available for consultation and the Medical Library reveals itself not only as a information center but a referral center providing rapid retrieval from all known information sources.

ON KEEPING UP WITH CURRENT MEDICAL LITERATURE

An Essay

Charles E. Becker, M.D.*

The problems and possible solutions to keeping up with current medical literature hinge upon one's selectivity and organization. Each physician must ask himself, "What should I read and how should I establish a functional recall system?".

As medical students, the entire field of medicine is so overwhelmingly thrust at us that it is exceedingly difficult to establish any type of system because of a lack of perspective and scope. During house officer training, the major problem is limitation of time. The practicing physician, researcher, or teacher, however, has clearly defined areas of interest and should be able to establish a workable recall system.

Some people use textbooks as their "system" rather than articles. This has been uniformly unsuccessful for me because texts are usually too broad in scope and the lag in time between writing and publication is too great. Of course, a few ready references are mandatory, but, in general, purchasing textbooks is expensive and often provides merely a decoration for one's library.

Since the dullest pencil is better than the sharpest brain (for organizing the filing system and for keeping information as ready-reference), I have found that the most readily accessible and systematic way of keeping up with the latest medical information is an individualized filing system — one that works for the individual himself. The organization must be both workable and enjoyable. If the system is so complex that it is constantly a bore and so incomplete that it has little usefulness, then the system is a failure. Ideally, a good filing system will provide a constant source of re-education and and will encourage learning for learning's sake as well as learning for the patient's benefit.

My first suggestion to help one establish his filing

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system would be that, as a professional, one asks a professional in that area — perhaps, your medical librarian or medical editor. I was fortunate to have a knowledgeable and experienced secretary who was familiar with such filing systems and we developed one which is functional both for herself and for me. My particular system involves a basic index in which the medical subspecialties are in drawers of a file cabinet and placed in alphabetical order within the subspecialties. The basic index is simple, for example,I have some as follows:

A. CARDIOLOGY	B. GASTRO-INTESTINAL
A1 Aneurysm-coarctation	B1 GI: General
A2 Angina Pectoris	B2 Liver: General
A3 Aortic Valve	B3 Acute Abdomen
A4 Arrythmias	B4 Acute Fatty Liver
C. RHEUMATOLOGY	D. ENDOCRINE
C1 Rheumatic Disease: General	D1
C2 Acute Rhematic Fever	D2
	et cetera
C3 Amyloidosis	D3
C4 Dermatomyositis	D4

A general practitioner might prefer to keep a broad index of perhaps Obstetrics, Pediatrics, Surgery, Medicine, and Drugs. A surgical subspecialist might prefer to keep special areas of interest labeled Particular Operations, Diagnostic Procedures, and Important Drugs. In my particular situation, I have found that the most convenient way has been to prepare the subspecialty areas of Internal Medicine — Cardiology, Gastro-intestinal, Rheumatology, Endocrine, Renal, Neurology, Infectious Diseases, Pulmonary, Hematology. Since I have further specialized my area of research and teaching into Clinical Pharmacology, Drug Abuse, and Alcoholism, I have added a separate file of specific

Clinical Pharmacological Agents, Drug Abuse, and related Alcohol topics.

Two key questions in such a system are: Should articles be cross-filed? and How do you know where to place the articles? This is also an individual matter. I think the important consistent feature is that you know the internal workings. For example, I have found that drugs used to treat Tuberculosis should be filed in the Pulmonary section, ie. Pulmonary Diseases, specifically Tuberculosis. Since I see so many consultations concerning drugs used to treat shock, I keep a separate file under the Pharmacology area specifically labeled Shock Syndromes, Drugs Used to Treat Shock. This is a personal preference. For another physician, it may be different, but, basically, it all relates to how one uses his system and what questions he asks of the system.

I have a master file list on top of my file system, a separate list on my desk in my office and at home in my study. My secretary has the final copy of the index to the filing system. Students and house officers have free access to the file as long as they sign for all articles. As I read an article, I remove it from the journal, refer to the master list in front of me and merely write with a red pen at the top of the article the specific file code for the article. My system involves only 250 categories which are easily found. Larger more complex systems have not worked for me.

Other key issues which tend to stress one's system is whether or not one should subscribe to many different journals, bind his journals, tear out articles from the journals, use a library and write summaries of all his reading on large cards, fill out postcards requesting particular articles, or purchase major medical reviews. I will give you my personal preference concerning each of these alternatives. Periodicals are expensive; bound journals are useless. They make beautiful shelf decorations, but they are not usually helpful. I tear out individual articles from all of my medical journals and use the shelf space for something more practical. Using the library in a regular way was too time-consuming for me. Some physicians have established a filing system which is made up of cards on which they have transcribed article summaries. Personally, this was too much work and not enough fun. I tried for two years to send postcards to physicians requesting reprints of articles I discovered in the library or from Current Contents. This effort was an absolute waste of time -- a failure. It

was expensive and I had such a low yield from return of articles that I often lost important articles. The review articles such as the Year Books of medicine and surgery have been relatively helpful to me, especially to plug holes in my reading. When I see a consultation, I review the particular Year Book. As I do this, I try also to spot any pertinent reference which is not in my file. I also think one can use the libraries more effectively if he reviews the Year Books. I should also add that I spend approximately five hours per week specifically keeping the filing system current by reading and reviewing. I discard out-of-date articles when I have occasion to review a specific file. This keeps the volume of the system acceptable.

There are several additional aids which help me keep up with the current medical literature. In subspecialty areas, there are often review journals that will summarize many other journals. The Journal of the American Medical Association, for example, will often abstract articles from many other journals. Since I am vitally interested in several areas of basic research, I have found that the National Library of Medicine's abridged Index Medicus which arrives monthly is extremely useful. The National Library of Medicine will also supply abstracts in selected areas which arrive bimonthly. I can keep up with the entire world literature in specific areas of basic research or important clinical areas by reading these abstracts. For specific questions in the medical literature many libraries now have available MEDLAR searches (Medical Literature Analysis and Retrieval System, National Library of Medicine). This involves a computer system which goes back several years and it can correlate clinical associations if these are relatively specific. For example, if one wanted to know whether or not hypotension in a patient who had received two separate drugs could be explained on a new drug interaction, one could "ask the computer recall" for the literature by programming in the names of the drugs along with the condition (hypotension).

Having with me a number (approximately 10-15) of 3x5 inch cards in my pocket or appointment book has helped me on numerous occasions. Whenever I attend a lecture or a meeting or see a patient with an unusual problem, I quickly jot any question or interesting facts on the card. I look up further information about it later and then write it briefly on the card. In a red pencil, I then write the master file letters and have my secretary file it. Over the past eight years, I have been able to review key patients' charts at other hospitals, or recall important "pearls" which I heard years ago, by merely reviewing my notes on this 3x5 cards.

Last but certainly not least, I have had some limited experience with reviewing tapes from Audio Digest. Since I have a half-hour drive to and from work, I have found this method of listening to tapes from important meetings enjoyable.

A filing system's most important assets are that is is simple, workable, and designed and implemented by one for his own benefit. Teach your secretary to help you. Read journals that are interesting and informative. And most of all, have fun. Once you graduate from medical school and finish house officer training, your professional education depends completely on one's self. One of the assets of our field of endeavor is that we never can learn all there is to know. We have to keep teaching ourselves and others about our chosen areas of specialization. Use of one's filing system is his own self- assessment to help him be critical about his own practice of medicine.

TABLE I

DESIRABLE CHARACTERISTICS OF FILING SYSTEMS FOR PROFESSIONAL PAPERS*

- –Can be adapted to interest of individual physician
- –Has logical arrangement
- –Is adaptable to expansion as new topics and subtopics arise
- –Is capable of accepting any medical *or* medically related article
- –Can be simply cross-referenced
- –Is coded – *i.e.* articles are filed by number (however it can be recognized that the coding is interrelated with the alphabet)
- –Is designed so that an article fits into *only one place*
- –Requires no rigid schedule for filing and refiling
- –Is economical (monetarily, and timewise)

*Applewhite L: TABLE I as it appeared in article, Filing systems. *Pres Conc Intern Med* 3:1071-1084 Nov 1970.

The November issue
is our time of year
to express appreciation
to those who have perpetuated PRESENT CONCEPTS IN INTERNAL MEDICINE.

Our Guest Editors have worked diligently to fill their symposia with outstanding papers and we appreciate their efforts and those of our own staff and the many contributors from medical centers across the country. To our readers, we give a special accolade: –from your many kind letters, you apparently have found *Present Concepts* a useful publication. The request to be on the mailing list and requests for reprints have been greater than our supply.

The *Present Concepts* symposia are typed in final form by the secretaries in the Department of Medicine –to them a special thanks: Miss Eiko Aiko (Pediatrics), Mrs. Seraphine Thiebaut (Hematology), Mrs. Gloria G. Swanson (Cardiology), Mrs. Louise Love (Pulmonary Disease) and Mrs. Marian Anderson (Rheumatology and Nephrology). Mrs. Buchanan, wife of the Chief, Neurology Service, prepared the majority of the pages for the October journal. Mrs. Helen Kvitky, secretary to the Chief, Department of Medicine, rotates the additional papers (as well as making her own contributions with skill and humor). We also thank Mrs. Elizabeth Wright, secretary to the Chief, Clinical Research Service, for doing the titling and preparing the tables on the IBM Selectric® Composer. The efforts of all these people have made Volume IV of *Present Concepts* happen –and we are sincerely appreciative.

With the support of the Command, our journal is reproduced by an offset process through the Publications Branch. For their continued cooperation our appreciation goes particularly to Mr. George Landucci and to the gentlemen who do the printing.

The Editorial Board

P.S. –The final "happening" (as well as the finesse with which it happens) happens because of our dedicated (and beloved) Medical Editor. Thanks, Lottie.

The Chief